U M O D P C

Airlift Operations Part II

612-502-03

References

DOD 4500.9-R, DTR, Part III, *Mobility*

FM 55-9, *Unit Air Movement Planning*

FM 55-65, *Strategic Deployment*

Military and CRAF Airlift Aircraft

C-130 "Hercules"

- Primary Function: Tactical and intra-theater airlift.
- Length: 97 feet, 9 inches
- Height: 38 feet, 3 in Wingspan: 132 feet

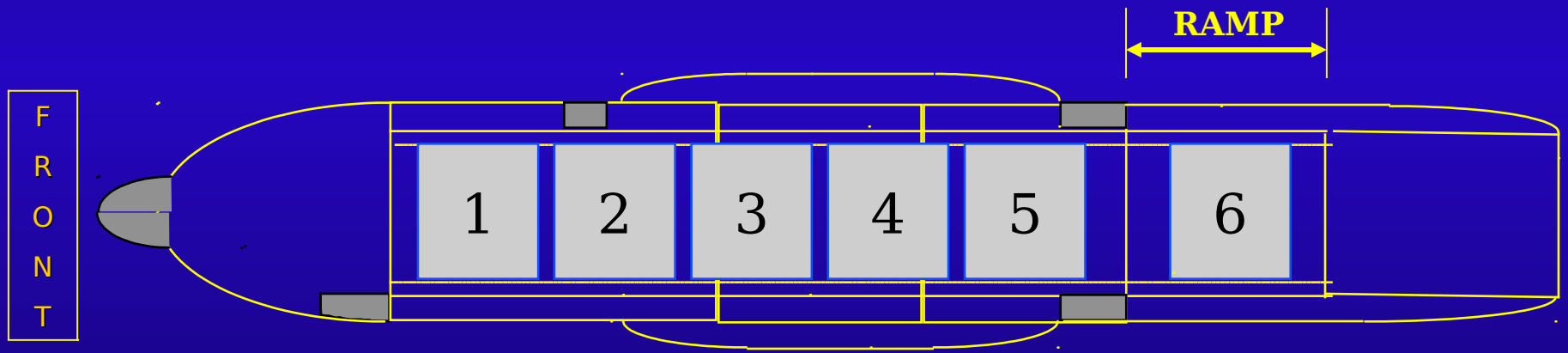
- Maximum Takeoff Weight: 155,000 pounds Range: 2,356 miles with maximum payload; 5,200 miles with no cargo

C-130 "Hercules" (Cont)

- Cargo Compartment: Length, 41 feet; Width,108 inches Height, 9 feet.

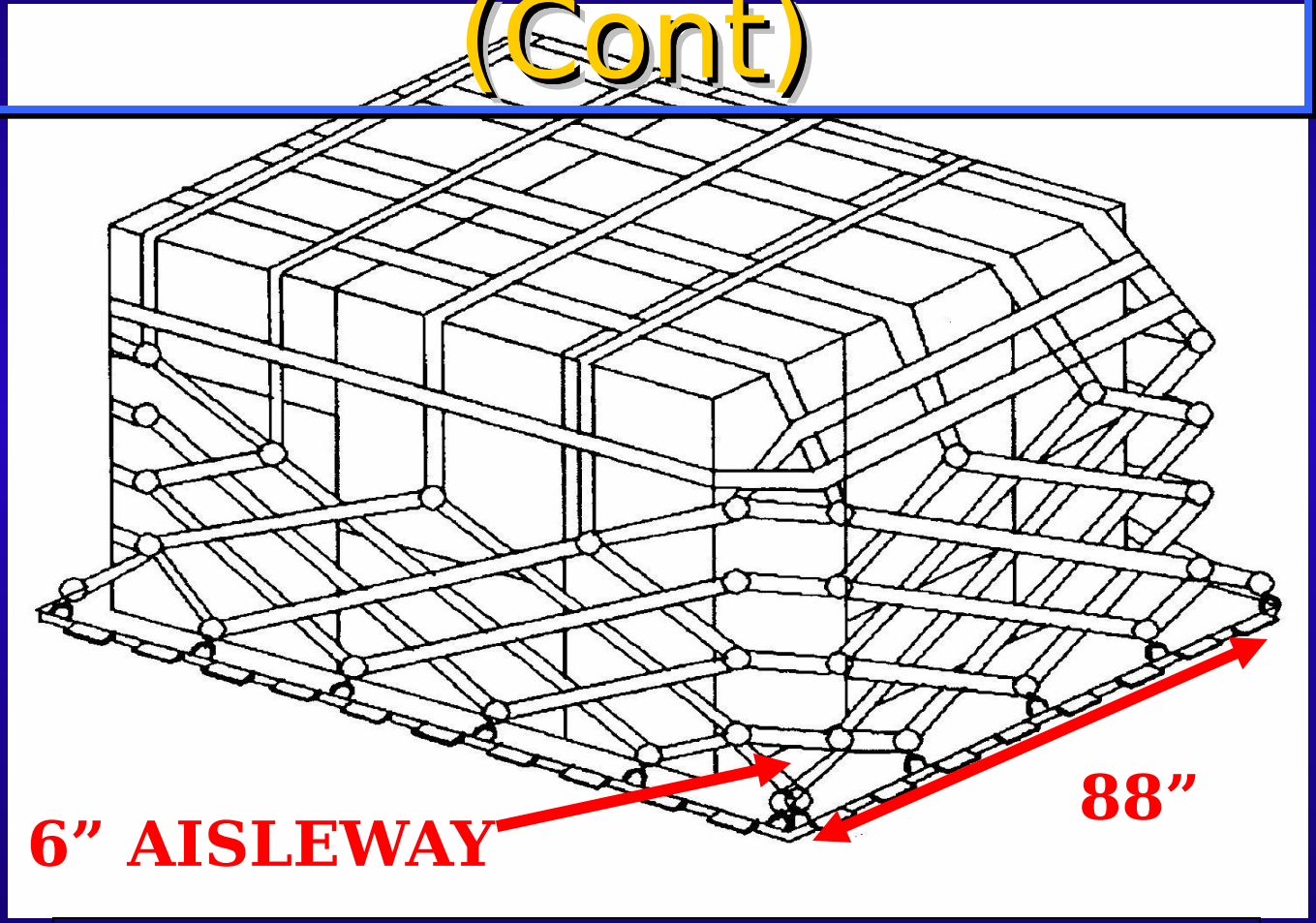
- Rear ramp (one pallet position); length, 88 inches; width, 108 inches; height, 76 inches

C-130 "Hercules" (Cont)



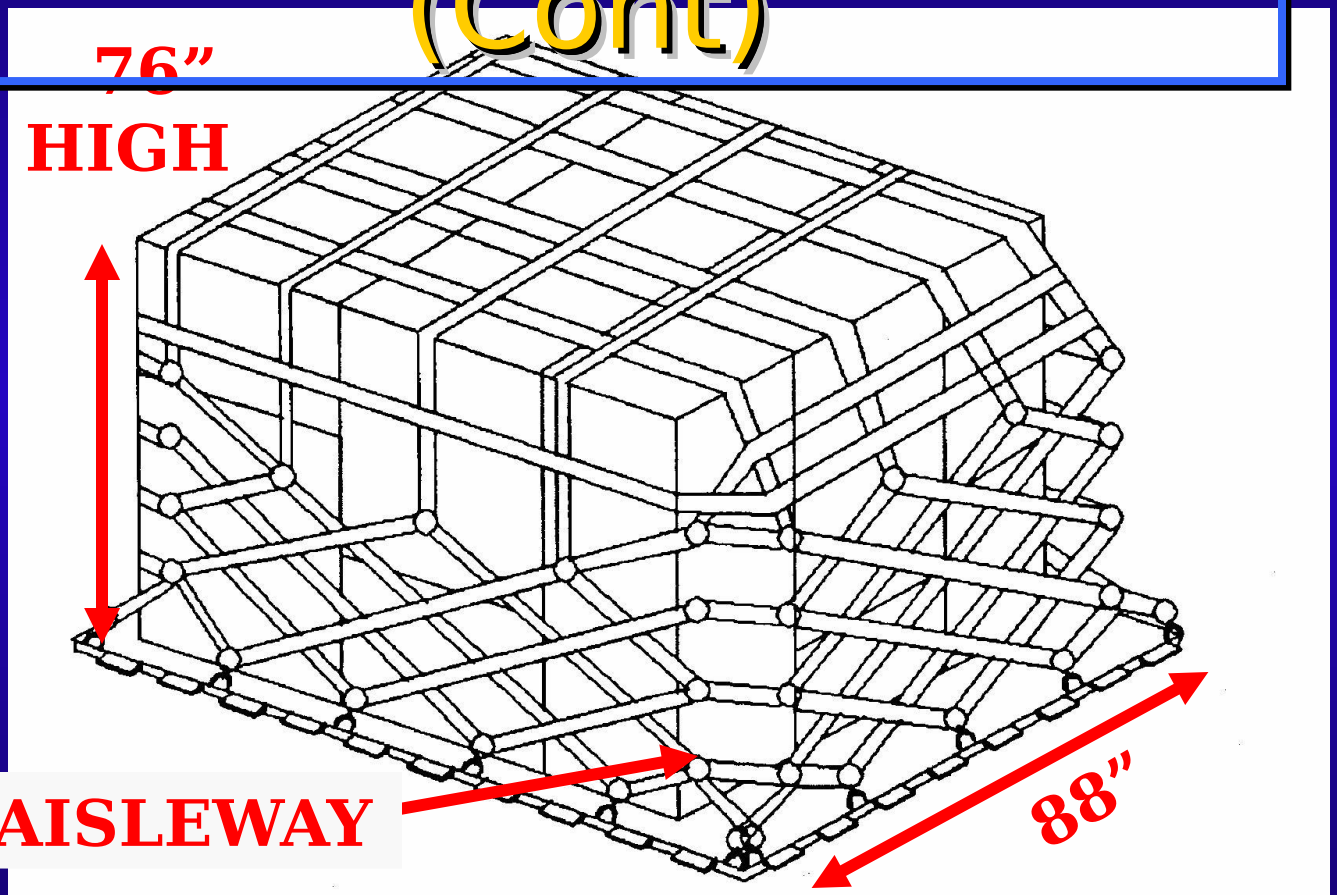
C-130 PALLET POSITIONS

C-130 "Hercules" (Cont)



C-130 PALLET POSITIONS 3 & 4

C-130 "Hercules" (Cont)



C-130 RAMP PALLET POSITION #6

C-130 "Hercules" (Cont)

- Crew: Five (two pilots, a navigator, flight engineer and loadmaster); transports up to 92 troops, 64 paratroops, 74 litter patients, or six standard freight pallets. Maximum cargo capacity is 45,000 pounds

C-141B
“Starlifter”

C-141B - PRIMARY MISSION IS INTERTHEATER AIRLIFT

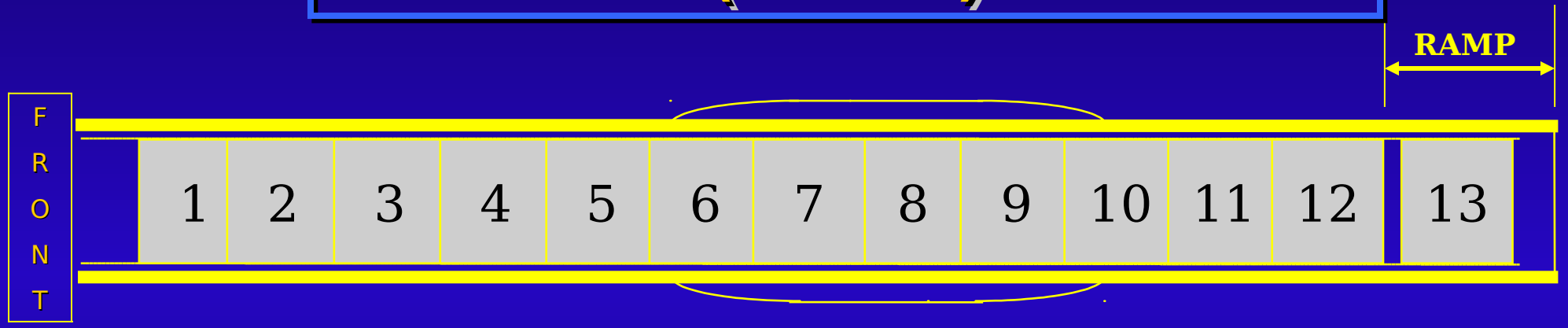
C-141B "Starlifter" (Cont)

- Primary Function: Cargo and troop transport
- Wingspan: 160 feet
- Length: 168 feet, 4 inches Height: 39 feet, 3 inches
- Range: Unlimited with in-flight refueling
- Maximum Takeoff Weight: 323,100 lbs

C-141B "Starlifter" (Cont)

- Load:
- Either 200 troops,
- 155 paratroops,
- 103 litters and 14 seats, or
- 68,725 lbs of cargo

C-141B "Starlifter" (Cont)



C-141B PALLET POSITIONS

- Cargo Compartment: Height, 9 feet 1 inch; length, 93 feet 4 inches; width, 10 feet 3 inches. Cargo Door: Width, 10.25 feet; Height, 9.08 feet

C-141B "Starlifter" ("Stretch")

- Crew of five: two pilots, two flight engineers and one loadmaster (one navigator added for airdrops). Aeromedical: two flight nurses and three medical technicians

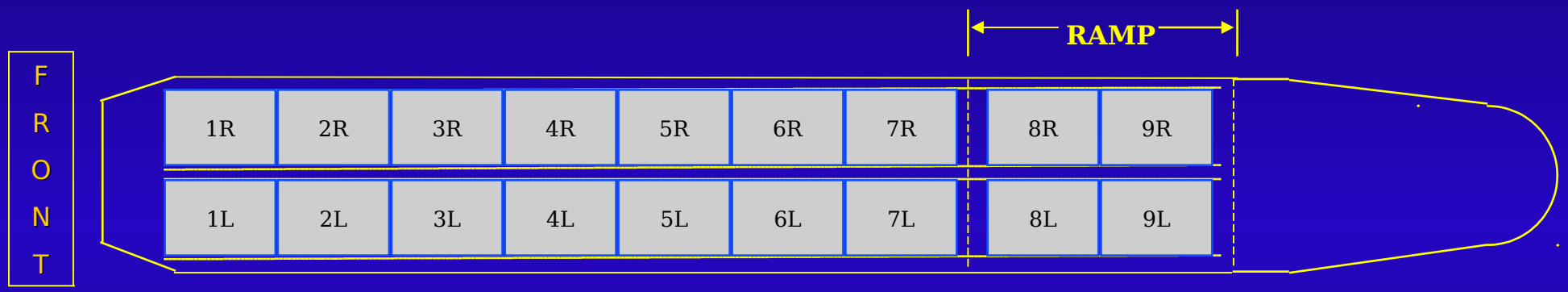
C-17 “Globemaster III”

- Primary Function: Cargo and troop transport
- Wingspan: 169 feet 10 inches (to winglet tips)
- Length: 174 feet
- Height: 55 feet 1 inch
- Range: Global with in-flight refueling.
- Maximum peacetime takeoff weight: 585,000 pounds

C-17 “Globemaster III” (Cont)

- Cargo Compartment:
- Length: 88 feet
- Width: 18 feet
- Height: 12 feet, 4 inches
- Cargo Load: 170,90(pounds of cargo (18 pallet positions)

C-17 “Globemaster III” (Cont)



PALLETS MUST BE ROTATED 90 DEGREES WHEN LOADING THIS CONFIGURATION

C-17 PALLET POSITIONS LOGISTICS CONFIGURATION

C-17 “Globemaster III” (Cont)

- Crew: Three (two pilots and one loadmaster)
- Load: 102 troops/paratroops; 48 litter and 54 ambulatory patients and attendants

C-17 “Globemaster III” (Cont)

C-5 “Galaxy”

- Primary function: Outsized cargo transport
- Wingspan: 222.9 feet, Length: 247.1 feet, Height:
- Range: 4,400 miles (loaded) 11,500 miles (unloaded)

C-5 “Galaxy” (Cont)

- Special ability to lower front or rear of aircraft for loading
- Crew: (pilot, co-pilot, two flight engineers and three

Forward kneeling

C-5 “Galaxy” (Cont)

- Cargo compartment: Height: 13.5 ft Width: 19 ft Length: 143 ft, 9 inches
- Maximum cargo capacity: 170,000 lbs

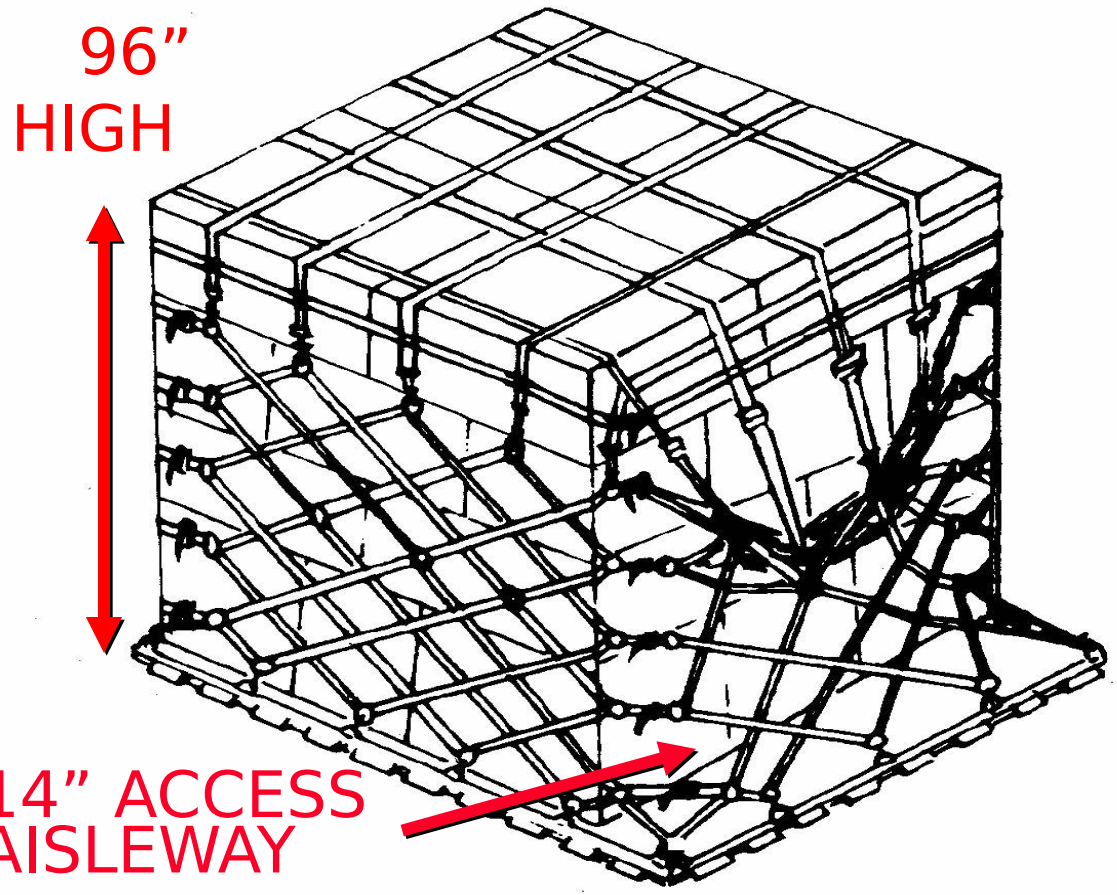
C-5 “Galaxy” (Cont)

C-5 Pallet Positions - 36

C-5 Pallet positions 1 & 2
- Fwd ramp

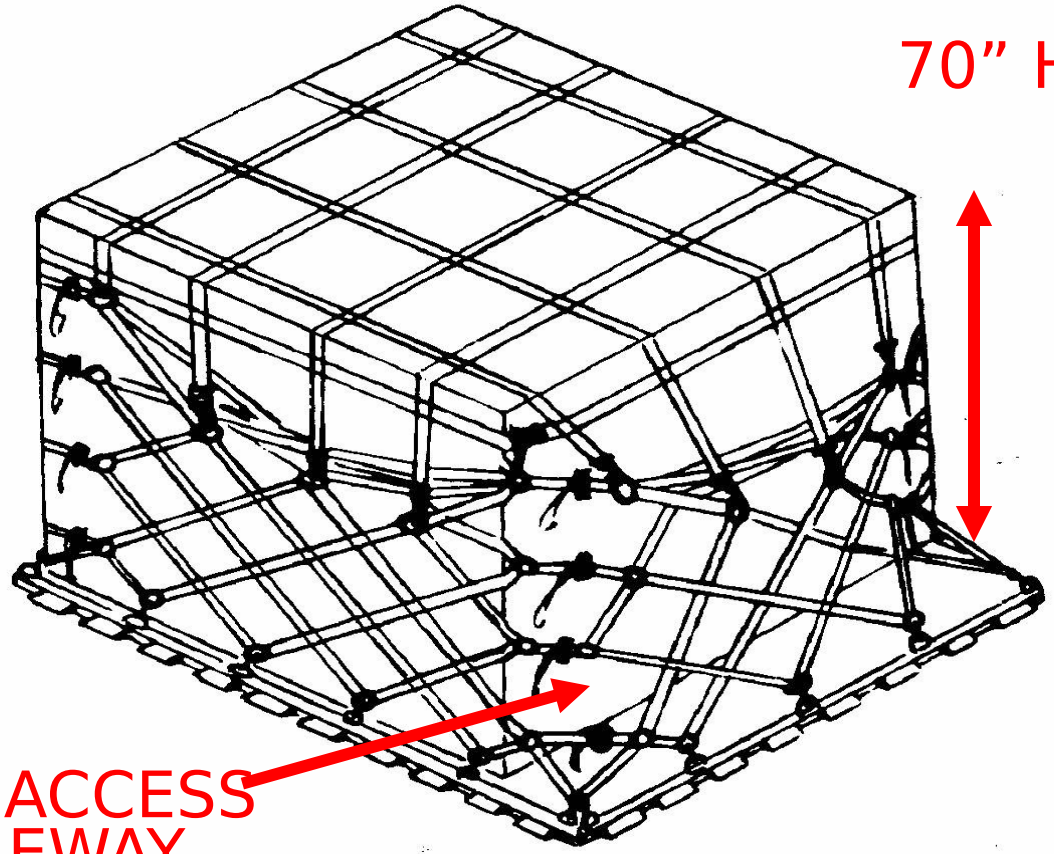
C-5 Pallet positions 35 & 36
- Aft ramp

C-5 “Galaxy” (Cont)



C-5 PALLET POSITIONS 1 & 2 - FWD RAMP

C-5 “Galaxy” (Cont)



C-5 PALLET POSITIONS 35 & 36 - AFT RAMP

C-5 “Galaxy” (Cont)

KC-10A "Extender"

- Primary Function: Aerial tanker and transport
- Length: 181 feet, 7 inches Height: 58 feet, 1 inch
- Wingspan: 165 feet, 4.5 inches

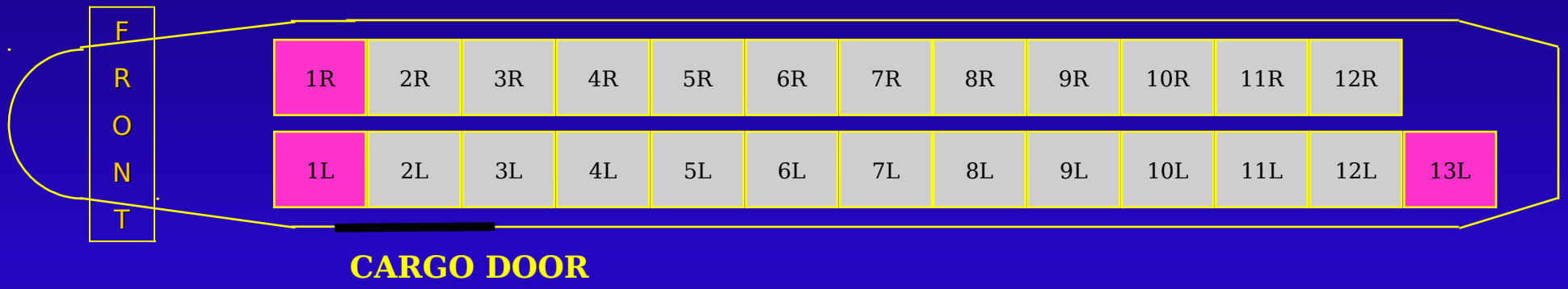
- Maximum Takeoff Weight: 590,000 pounds
- Range: 4,400 miles (3,800 nautical miles) with cargo

KC-10A “Extender” (Cont)

- Maximum Cargo Payload: 170,000 pounds
- Pallet Positions: 25
- Crew: Four (aircraft commander, pilot, flight engineer and boom operator)

KC-10A "Extender" (Cont)

KC-10 PALLET POSITIONS

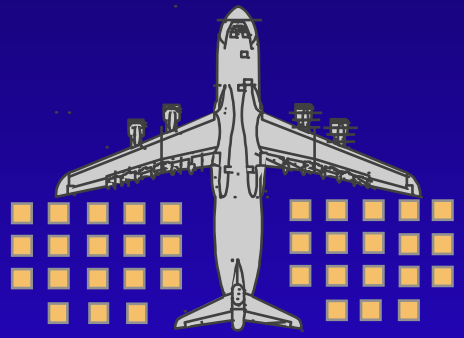


- NOTE: Positions 1L & 1R are normally not used (seats installed) Pallet position 13L is not offered for cargo

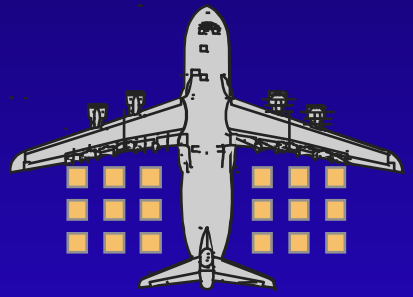
- Pallets must be rotated 90 degrees to be loaded

Aircraft Comparison

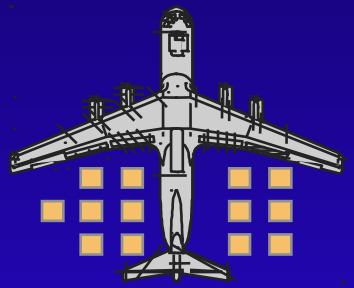
C-5



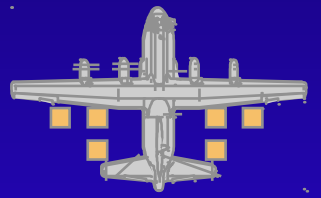
C-17



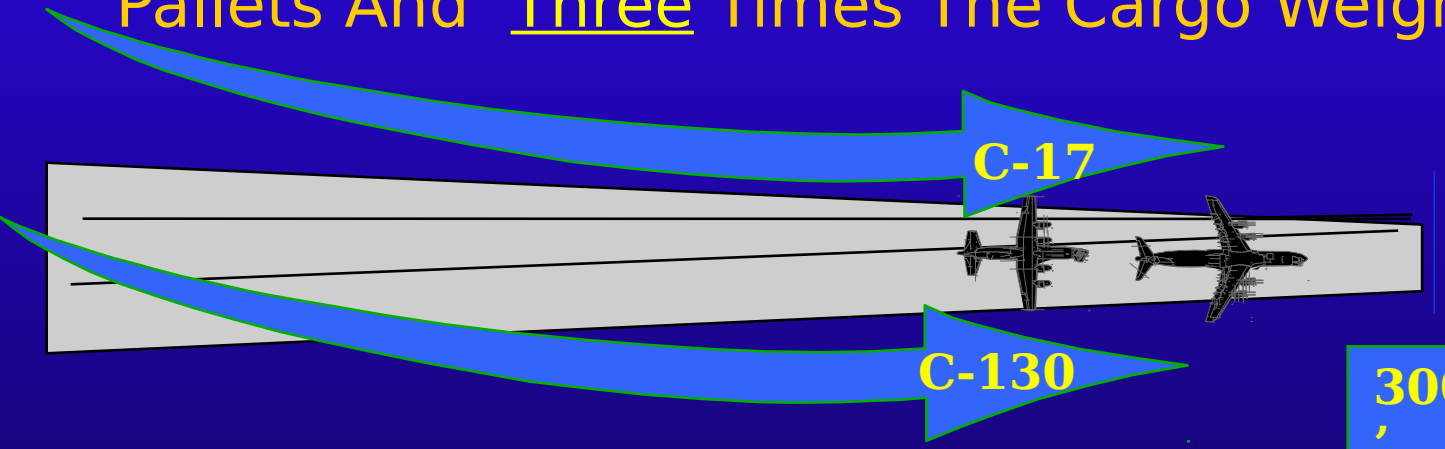
C-141

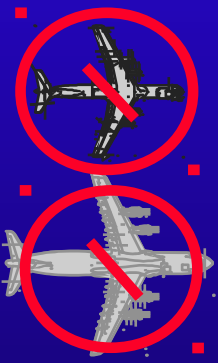


C-130



- C-17 External Size Similar To C-141, But Carries Five More Pallets And Three Times The Cargo Weight



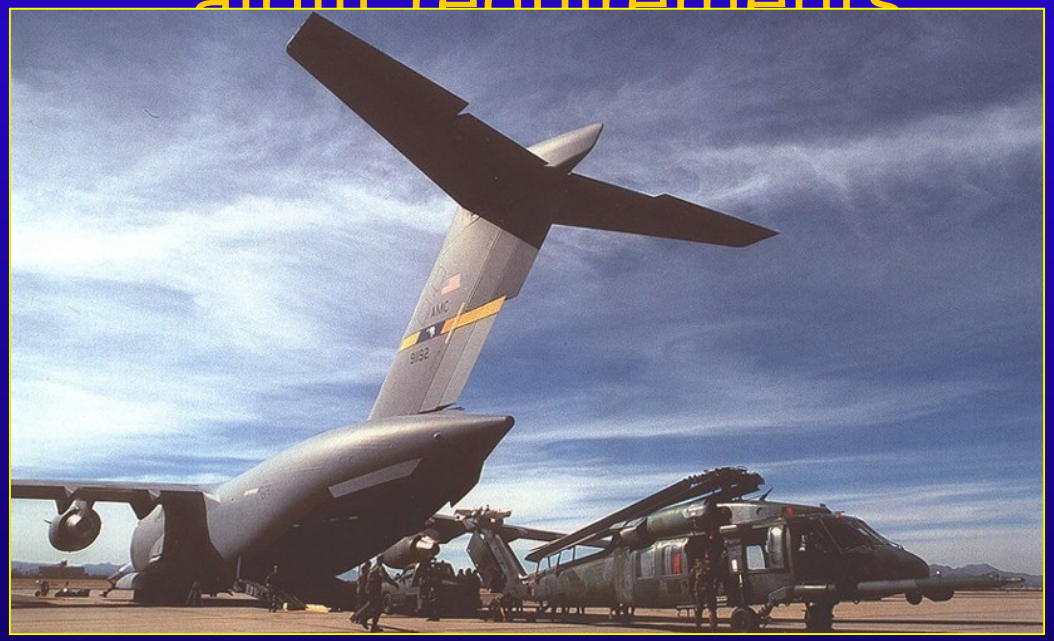


- C-17 Lands At C-130 Size Airfields, But Carries Three Times The Number Of Pallets And Five Times The Cargo Weight

Civil Reserve Air Fleet (CRAF)

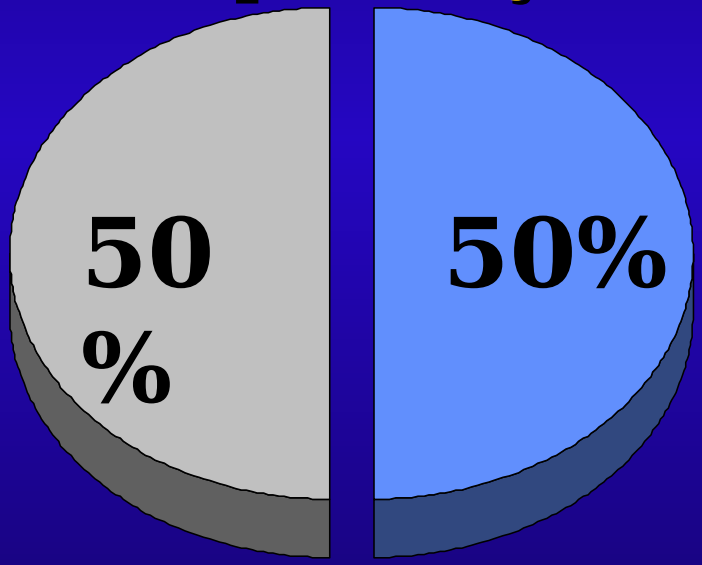
CRAF (Cont)

- CRAF is a voluntary contractual program designed to augment US military airlift forces with civil air carriers to support national defense emergency airlift requirements

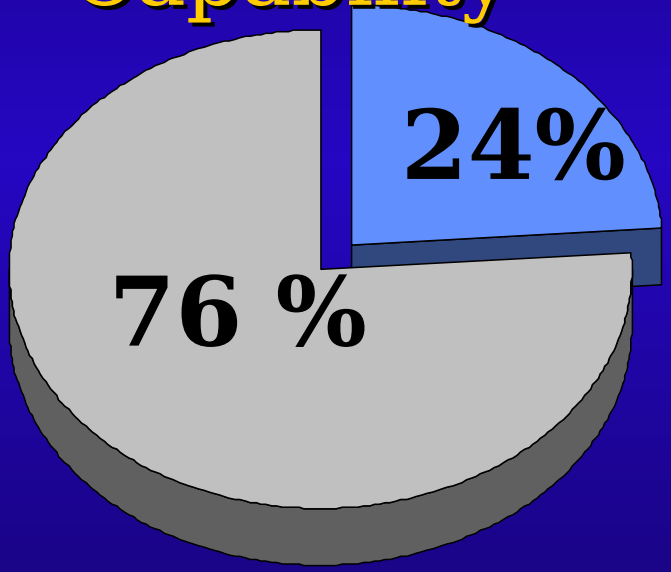


CRAF (Cont)

Strategic Capability



Cargo Lift Capability

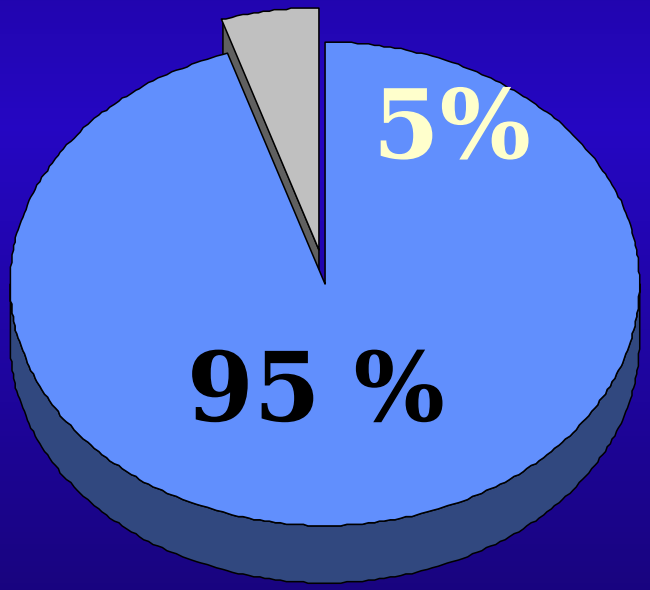


ORGANIC AIRLIFT

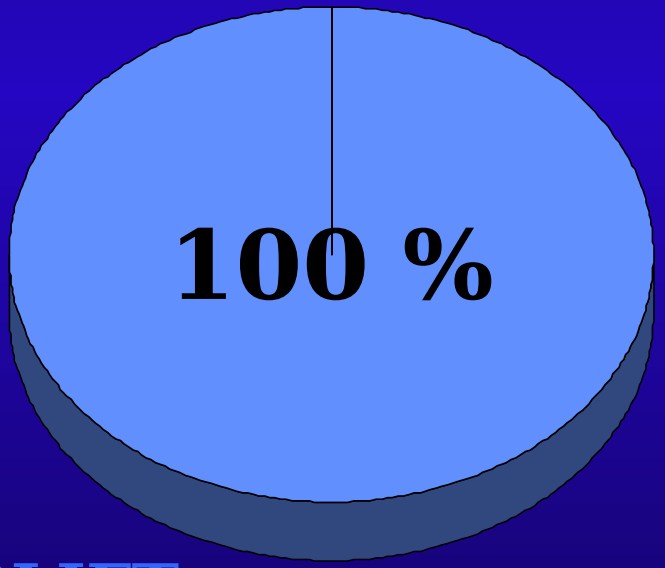
COMMERCIAL AIRLIFT

CRAF (Cont)

Passenger Lift Capability



Aeromedical Evac Lift Capability



ORGANIC AIRLIFT

COMMERCIAL AIRLIFT

CRAF (Cont)

CRAF OPERATIONAL STAGES

- STAGE I - Committed expansion to 77 aircraft
- STAGE II - Airlift Emergency - additional 182
- STAGE III - Military Emergencies up to an additional 544 aircraft available

NOTE: DOES NOT HAVE TO BE ACTIVATED IN STAGE ORDER

CRAF aircraft totals change quarterly. Approximately 800+ aircraft available (1st Qtr FY 01)

CRAF (Cont)

- CRAF Operational Segments
  - International segment:
    - Short range section
    - Long range section
  - Aeromedical segment
  - National segment:
    - Domestic & Alaska sections

Summary

On Learning

On Learning

QUESTION 1: What are the two primary aircraft used for strategic airlift of soldiers and cargo?

Answer 1: The C-17 and the C-141

On Learning

QUESTION 2: What military cargo aircraft provides strategic airlift for moving outsized and oversized cargo?

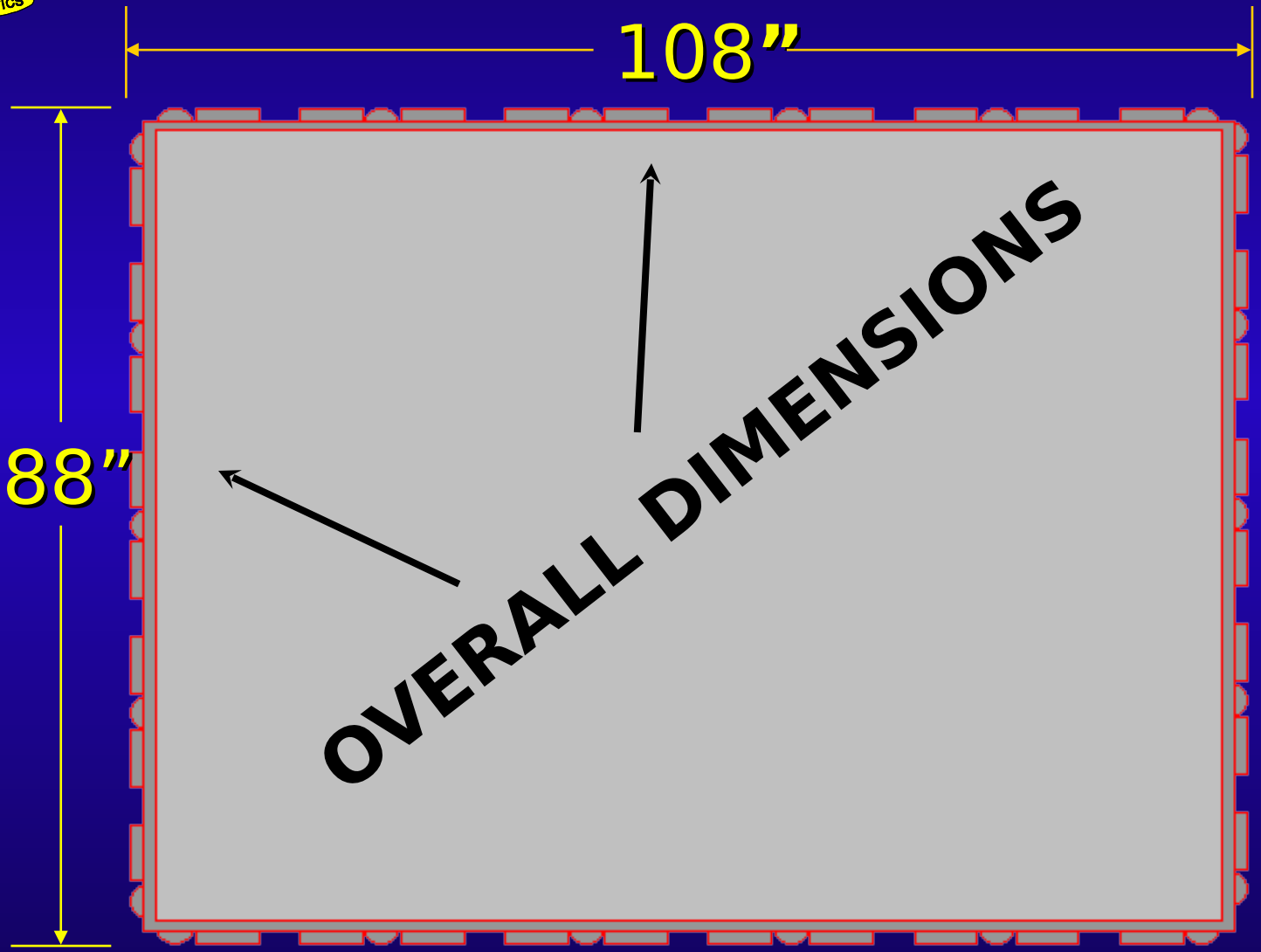
Answer 2: The C-5

463L Pallet System

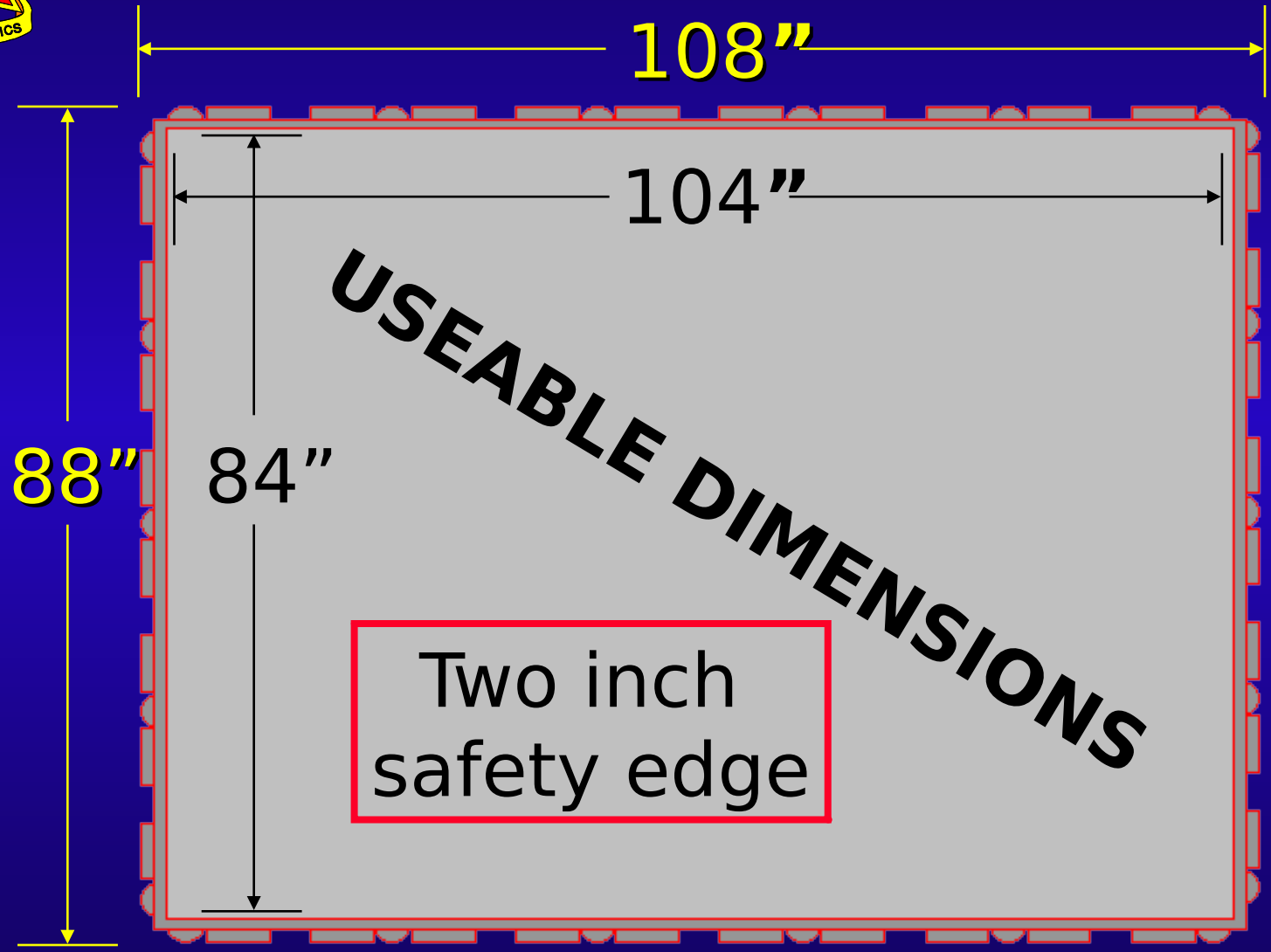
463L Pallet System

- Proper restraint of cargo is important in an air movement due to the possibility of cargo shifting during flight.
- The 463L pallet system provides deploying units with the ability to consolidate loose cargo and efficiently move it on strategic airlift

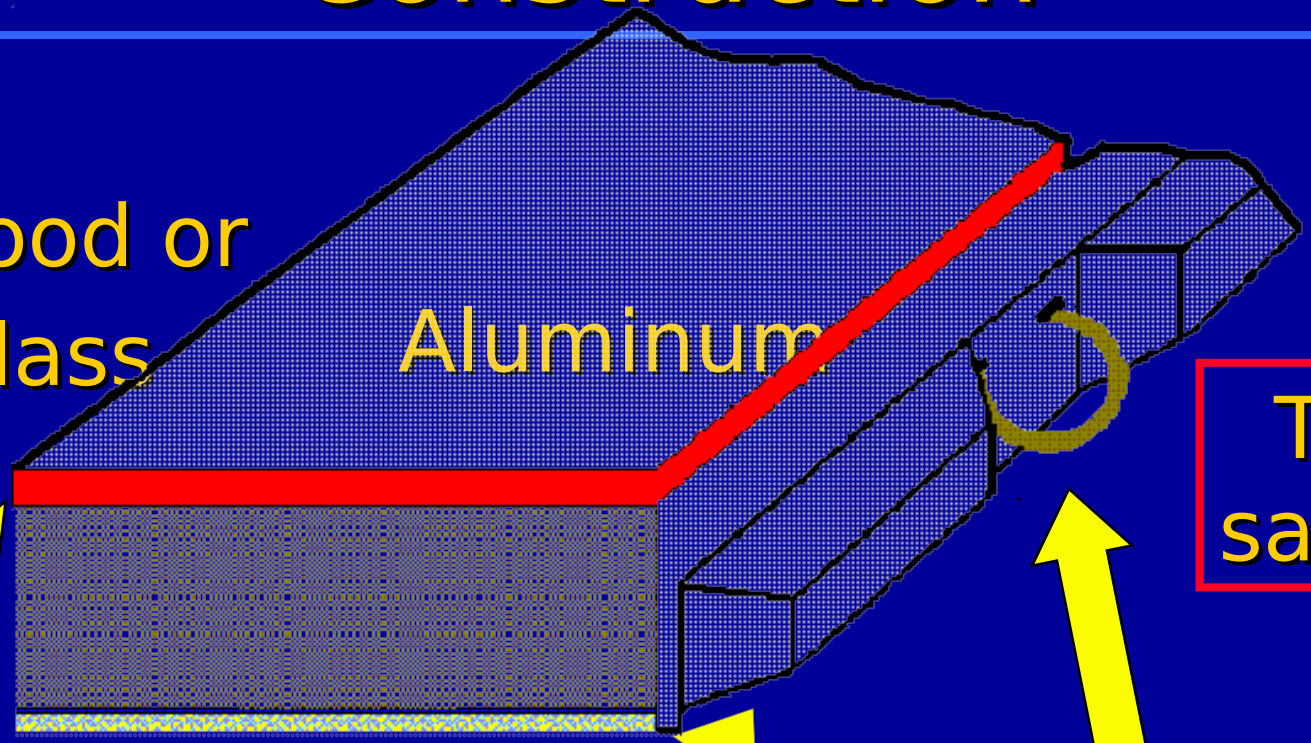
463L Pallet



463L Pallet (Cont)



463L Pallet Construction

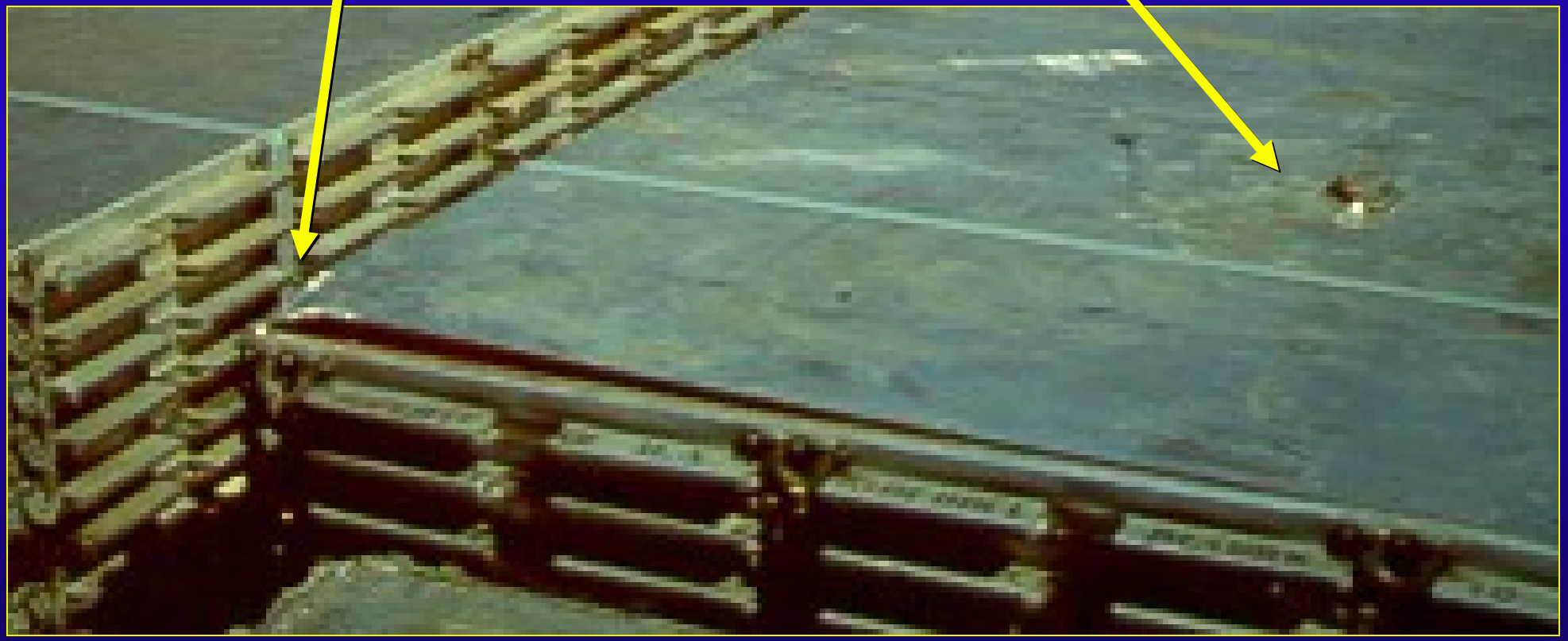


463L Pallet Serviceability

- Inspect pallets for serviceability prior to use
  - Check both pallet sides for fractures or warping
  - Tie-down rings must move freely
  - Excessive corrosion makes pallet unserviceable
  - Check for cleanliness. Pallet must meet agricultural standards.

463L Pallet Serviceability (Cont)

- Pallet damage
- Cleanliness



463L Pallet Nets

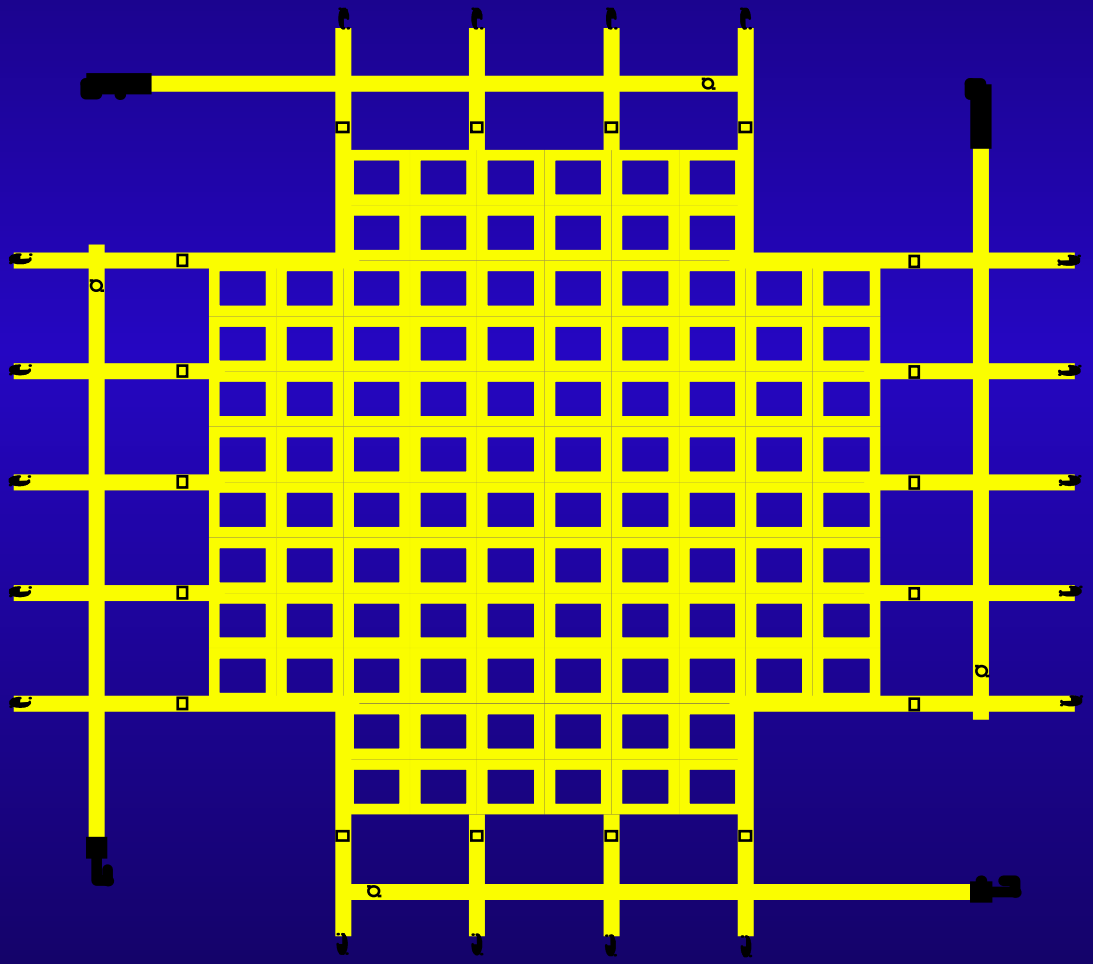
- There are three nets to a set of 463L pallets nets The set consists of one top net colored yellow, and two side nets colored gree or black.

463L Pallet -- Net Serviceability

- After spreading the net on a dry clean surface, inspect the bands and straps for tears and fraying. Check for:
  - Loose or broken stitches
  - Broken/missing O-rings & hooks
  - Broken buckles
  - Dirt & foreign objects

463L Pallet Nets -- Top net

Top net



463L Pallet Nets -- Top net (Cont)

- The top net attaches by hooks to the rings on the side nets or, when used alone, to the tie-down rings on pallet.

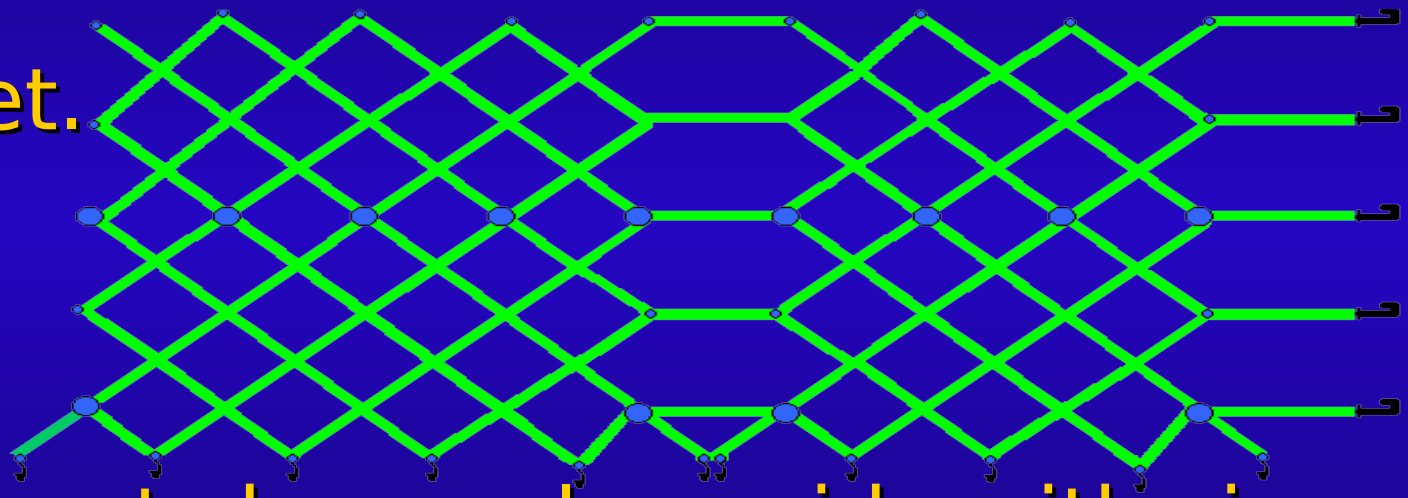
- When a top net is used alone, the net band sewn closest to the hooks (referred to as belly band) must not be more than eight inches fro the top of the pallet surface.

463L Pallet Nets -- Top net (Cont)

- The top net can be used alone or with additional straps to secure the load

463L Pallet Nets --Side Nets

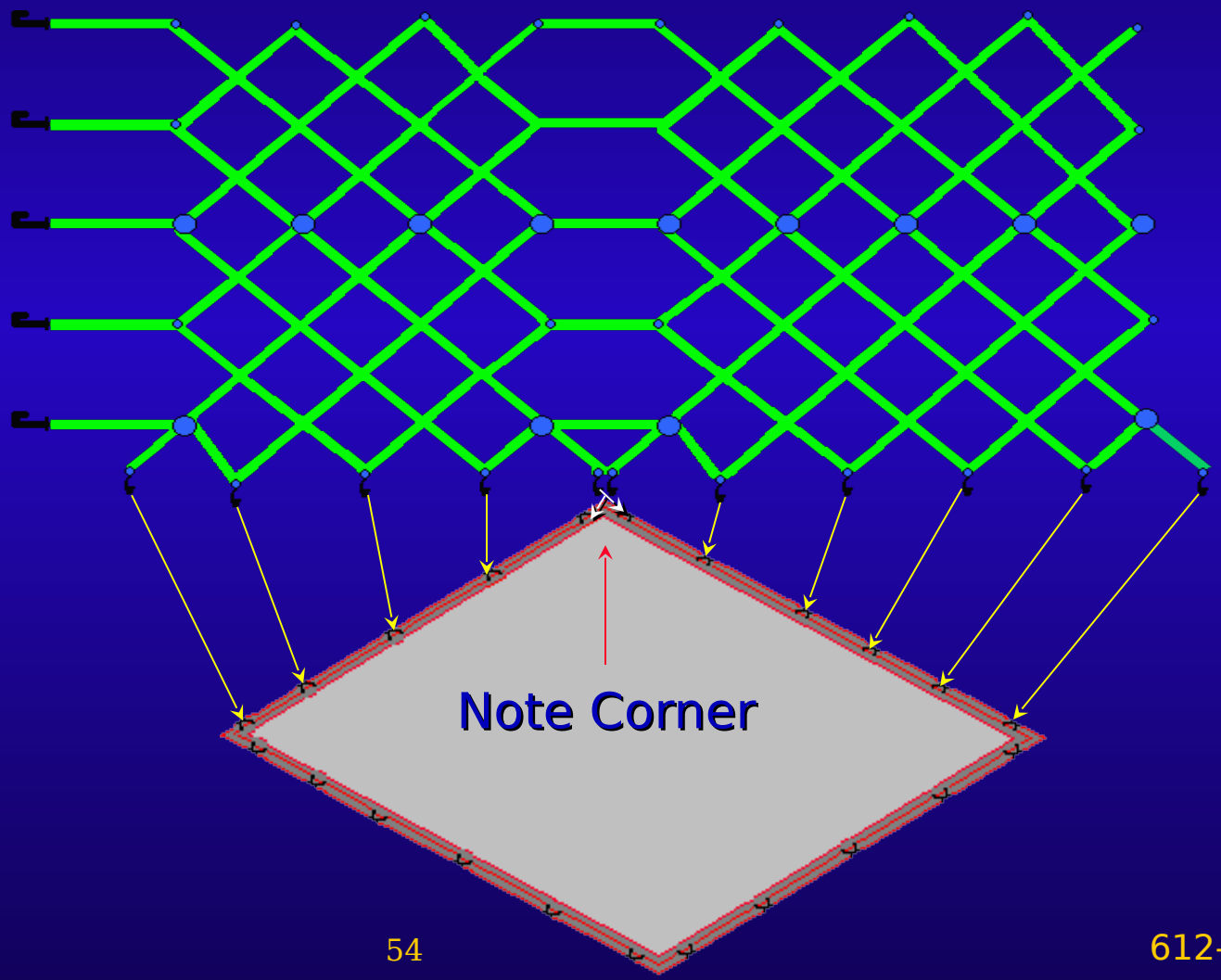
- The side nets attach by hooks to the rings of the 463L pallet. Side nets (1 of 2)



- The side nets have a long side with six hooks and short side with five hooks to match the long and short sides of the 463L pallet.

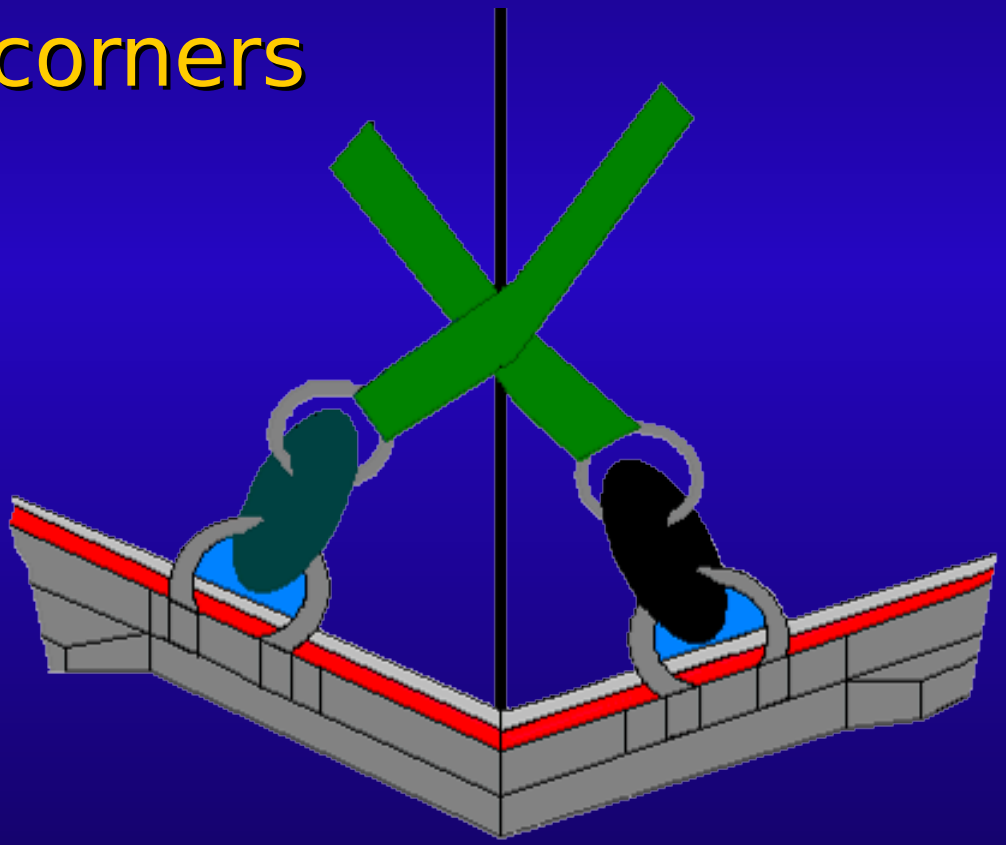
463L Pallet Nets --Side Nets (Cont)

- Connecting the side net to the 463L pallet
- All hooks point to inside



463L Pallet Nets --Side Nets (Cont)

Straps crossed at corners



463L Pallet Restrictions

- 463L pallets load restrictions prevent damag cargo, 463L pallets and nets, and the aircraft
- Ensure build-up pallets do not exceed the dimensional and load bearing capabilities of the aircraft.

463L Pallet Restrictions -- Weight Maximums

- Maximum weight capacity is 10,000 lbs
- Maximum load of 250 pounds for any given square inch
- Tie-down ring load must not exceed 7,500 pounds
- If top net alone is used to restrain cargo, the cargo load capacity is 2,500 lbs

463L Pallet Restrictions -- Height Maximums

- Height maximums for built-up 463L pallets relate to the weight of the cargo load.
- With cargo load of 10,000 lbs - the height will not exceed 96 inches
- With cargo load of 8,000 lbs or less - the height will not exceed 100 inches
- When only the top net is used, the height is limited to 45 inches, and weight to 2,500 pounds

Building the 463L Pallet

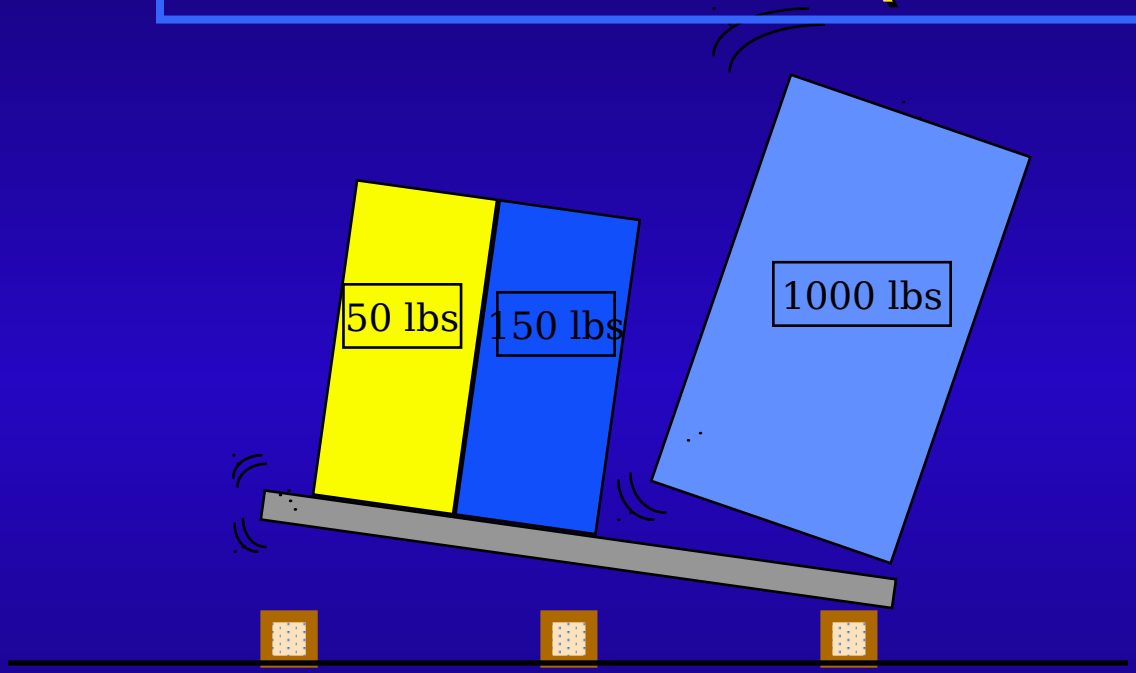
Building a 463L Pallet

- Place the pallet on dunnage before beginning the build-up.

Pallet Cargo Placement

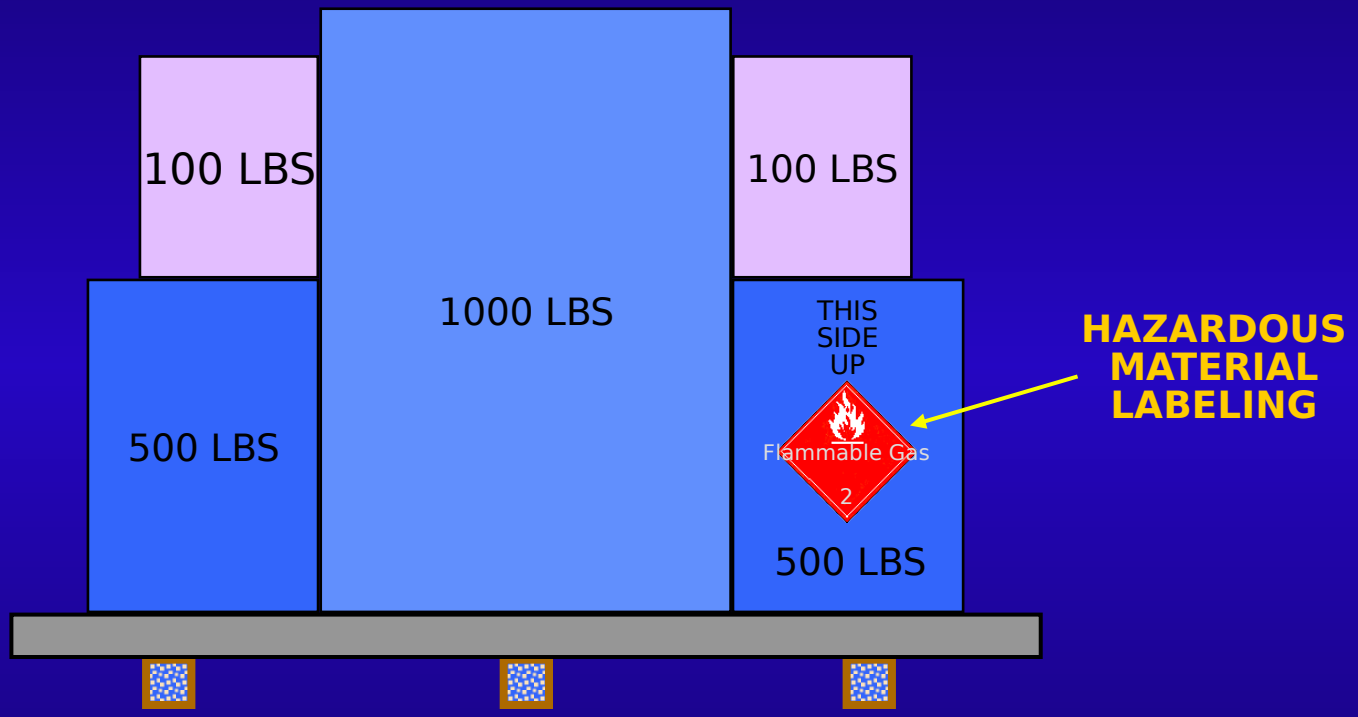
- Properly building a load on a 463L pallet contributes to the safe air movement of the cargo
- Place cargo items in square or pyramid shape when building pallet

Pallet Cargo Placement (Cont)



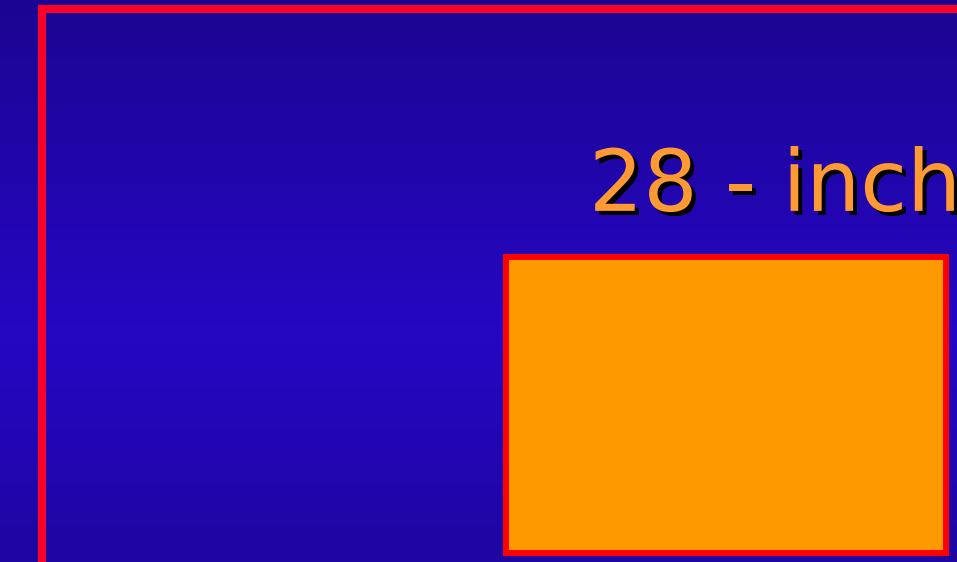
Heavy Ended Pallet

Pallet Cargo Placement (Cont)



Correct placement of cargo & labeling of hazardous materials

Pallet Cargo Placement (Cont)



Load C/B must fall within a 24-inch by 28-inch rectangle on the pallet center

Build and Document the Pallet

- Secure the load on the pallet using proper tie-down procedures and equipment.
- Weigh each pallet including dunnage that accompanies pallet
- Measure pallet height
- Record pallet height and weight on cargo manifest and pallet identification card

Pallet Markings

- The pallet requires marking to identify contents, ownership, and other information required for the air move

Pallet Board Information

- The information on the pallet board includes:
  - A packing list of the shipping containers on the pallet including any hazardous materials
  - The identification and name of the unit
  - Military shipment label and/or RF tag
  - List of points of contact & telephone numbe
  - Gross weight must be displayed on both boa

Tie-down Equipment

- Tie-down equipment is essential to ensure the cargo is secured during flight.

Nets

CGU-LB Nylon Strap

MB-1 Tie-down chain

MB-1 Tension Device

MB-2 Tie-down chain

MB-2 Tension Device

Other 463L Pallet Equipment

- Pallet covers
  - Use plastic for water sensitive or absorbent items
  - Short term use only
- Pallet Coupler
  - Ties two or more pallets together
  - Used for long loads

Tie-down Techniques

- Tie-down techniques vary according to the items to be secured
  - The barrier and chain techniques
    - Palletized vehicles and large heavy items are chained to pallet
  - 5,000 pound tie-down straps

Net Installation

- Nets are used to secure multiple loose items fit within the useable dimensions (84 by 104 inches) of a single 463L pallet.
  - Start at one corner and work around the pallet with side nets
  - Pull the nets as high as they will go and hook the two side nets together.
  - Center the top net over the cargo

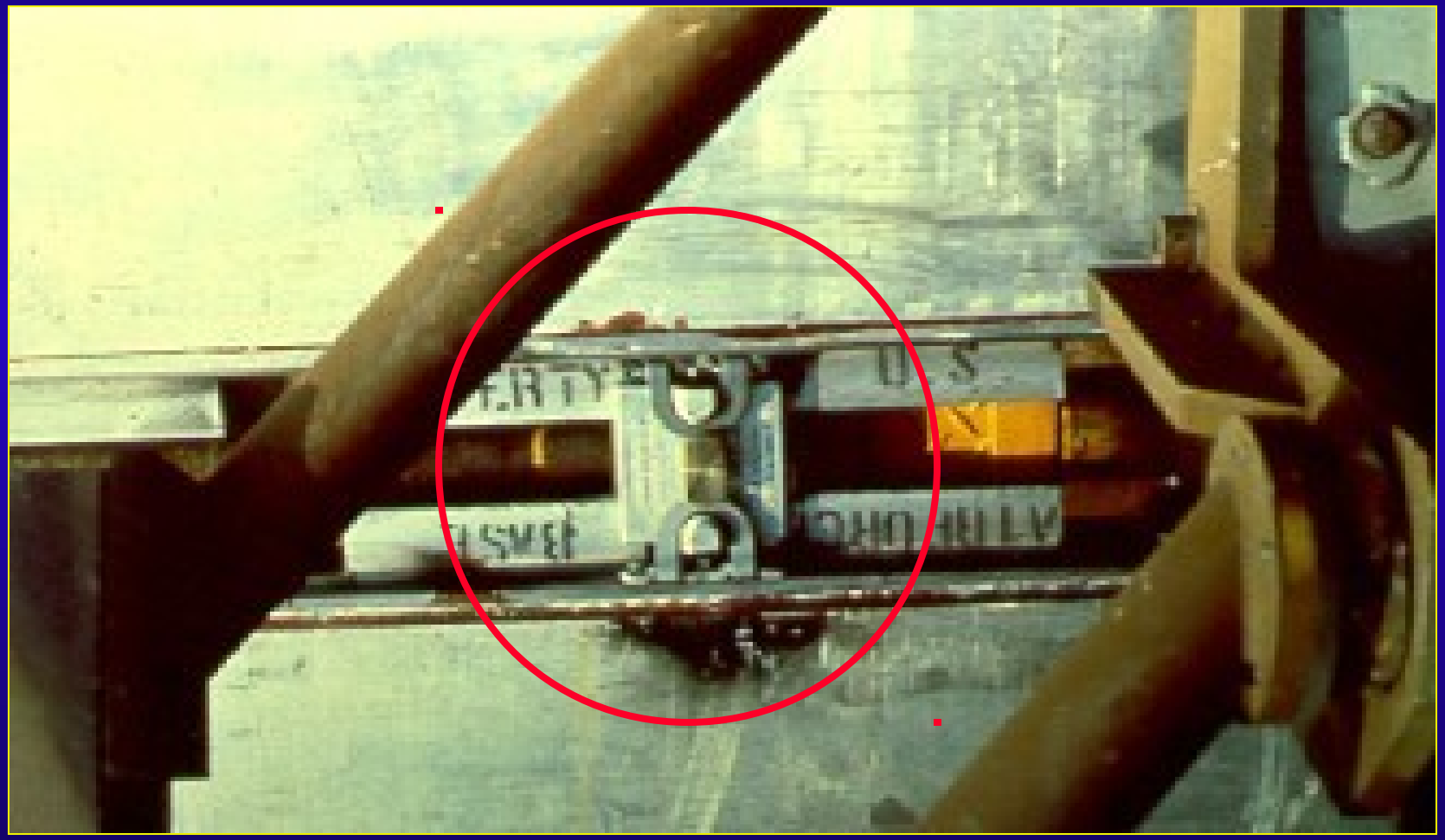
Net Installation (Con't)

- Hook the top net into the side nets using the 0-rings located on the top portion of the side for a tall load, or the 0-rings located halfway the side nets for a shorter load.
- Pull evenly on all straps opposite each other tighten the top net.
- Tuck the loose ends of all straps into the net to prevent snagging during loading or unloa

Married Pallets

- Married pallets:
  - Used for cargo that exceeds length of a single pallet.
  - Formed by joining two or more 463L pallets
  - Pallet couplers are placed in the indents along the aligned pallet sides to lock the pallets together.

Married Pallets Example



Married Pallets (Con't)

- Married pallets become a rigid structure after are locked into the 463L rails on the aircraft.
  - Pallets must be kept level during loading/unloading
- Married pallets should be constructed on high-liner docks or other platforms.

Married Pallet Load

high-liner dock and coupled pallet

SUMMARY

On Learning

On Learning

QUESTION 1: What type and how many 463L pallet nets are in a set?

Answer 1: There are three nets to a set; one top and two side nets

On Learning

QUESTION 2: What are the usable dimensions on the 463L pallet surface for constructing a pallet load?

Answer 2: 104 inches long and 84 inches wide

On Learning

QUESTION 3: What is the maximum cargo weight capacity for a 463L pallet?

Answer 3: The cargo weight capacity for a 463L pallet is 10,000 pounds.

Determine Center of Balance

Determine Center of Balance

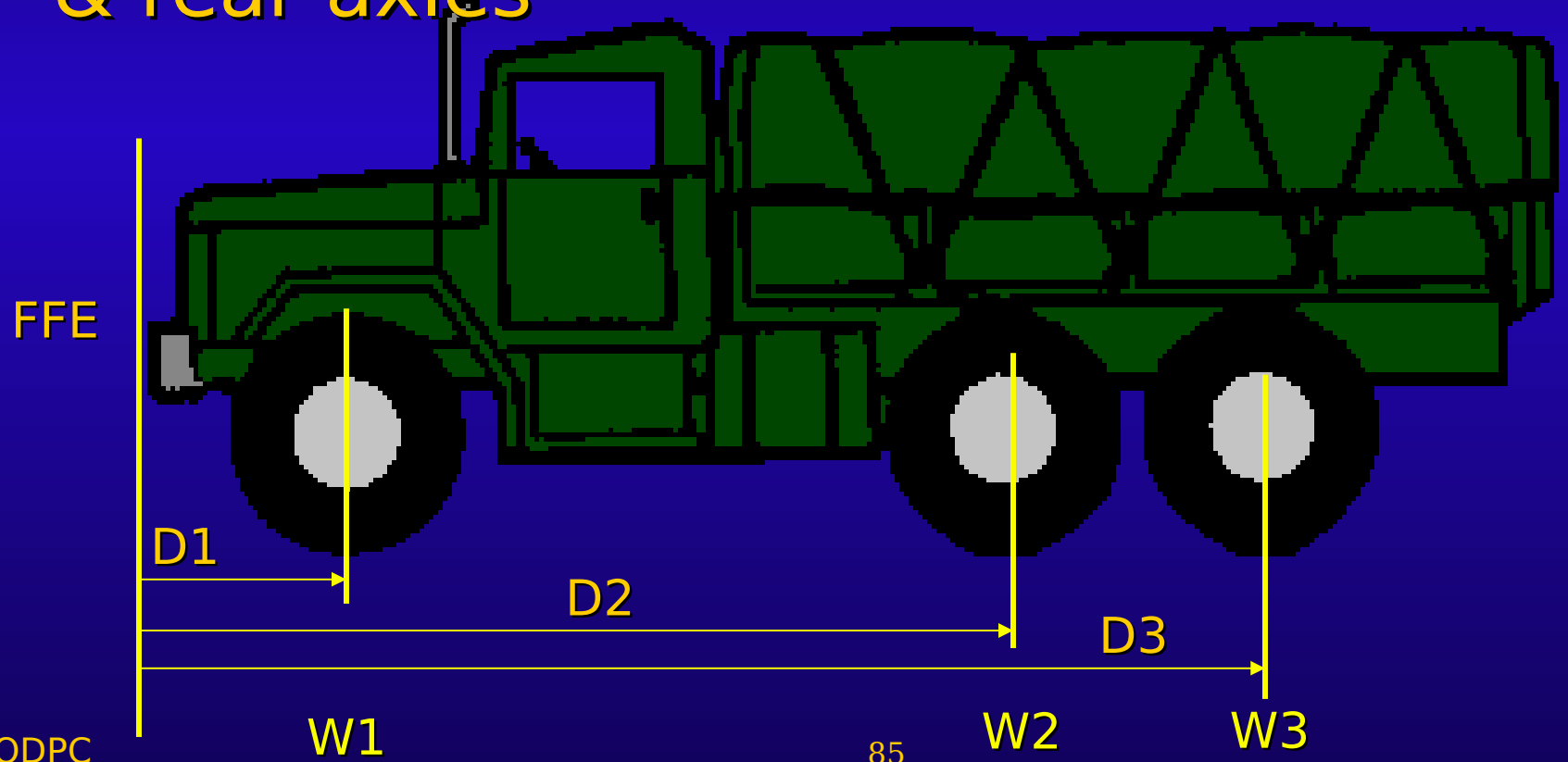
- Each aircraft has a Center of Balance safety range
- The unit's aircraft cargo must fall within the aircraft safety range
- The term CB refers to the balance point of items of cargo or equipment that go into the aircraft

Determine Center of Balance (Cont)

- Determine weight and CB of a vehicle after all secondary loads are secure
  - No items should be added or removed from a vehicle that has been weighed and the CB calculated. If changes are made, the vehicle must be weighed again and the CB recalculated

Determine Center of Balance (Cont)

- Determine distance from front forward edge (FFE) to the middle of the front, intermediate & rear axles



Determine Center of Balance (Cont)

W1= Front axle weight in pounds
W2 = Intermediate axle weight
W3= Rear axle weight
D1= Distance in inches, from FFE to Front axle
D2= Distance from FFE to Intermediate axle
D3= Distance from FFE to Rear axle

$$CB = \frac{(W1 \times D1) + (W1 \square D1) + (W2 \square D2)}{\text{gross weight}}$$

Determine Center of Balance (Cont)

W1= 5,000 lbs

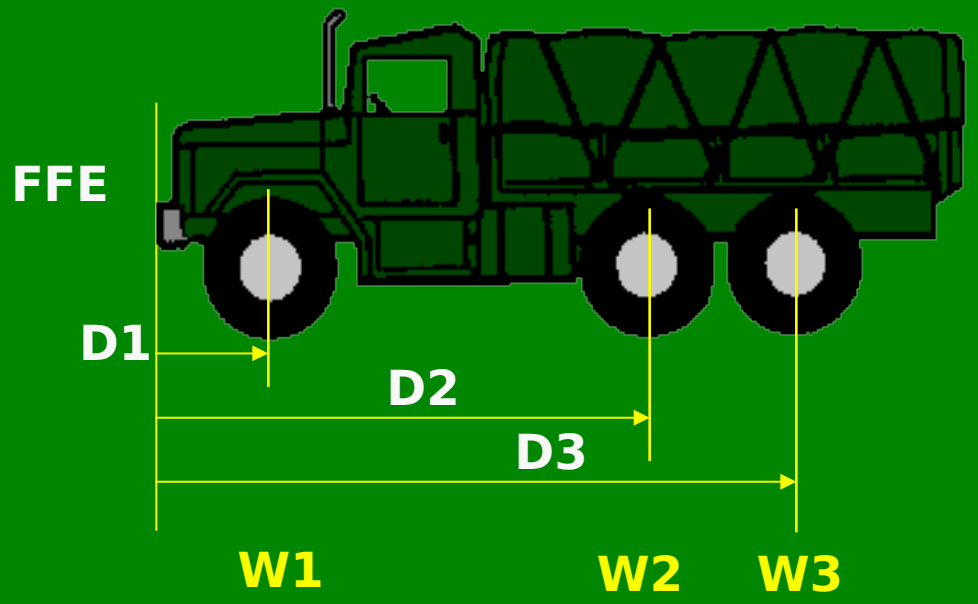
W2 = 5,000 lbs

W3 = 5,000 lbs

D1 = 35 inches

D2 = 131 inches

D3 = 177 inches



Determine Center of Balance (Cont)

$$CB = \frac{(W1 \times D1) + (W2 \times D2) + (W3 \times D3)}{GW}$$

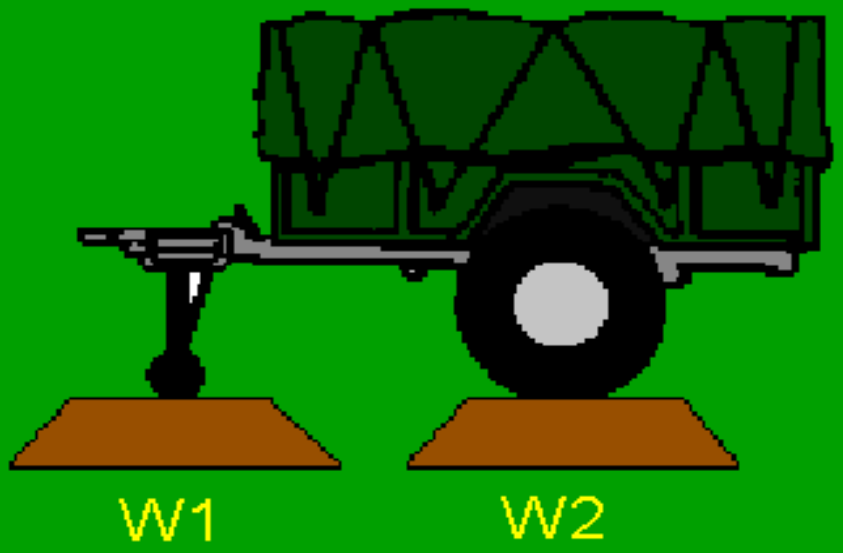
$$CB = \frac{(5{,}000 \times 35) + (5{,}000 \times 131) + (5{,}000 \times 177)}{15{,}000}$$

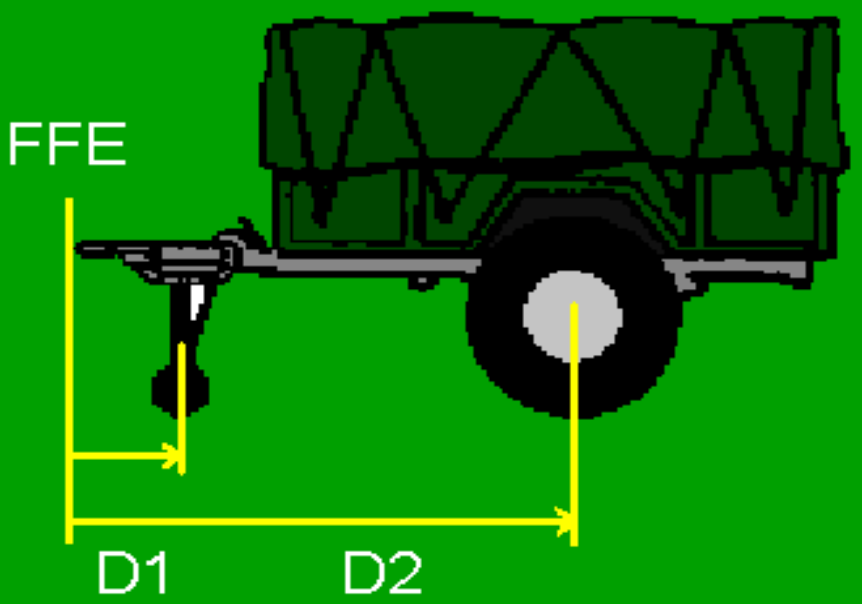
$$CB = \frac{175{,}000 + 655{,}000 + 885{,}000}{15{,}000}$$

$$CB = \frac{1{,}715{,}000}{15{,}000}$$

CB = 114.33 or 114 inches (rounded to nearest inch)

Determine Center of Balance -- Trailer





W1 = 150 LBSW2 = 3,600 LBS

D1 = 15 Inches D2 = 95 Inches

Determine Center of Balance -- Trailer (Cont)

$$CB = \frac{(W1 \times D1) + (W2 \times D2)}{GW}$$

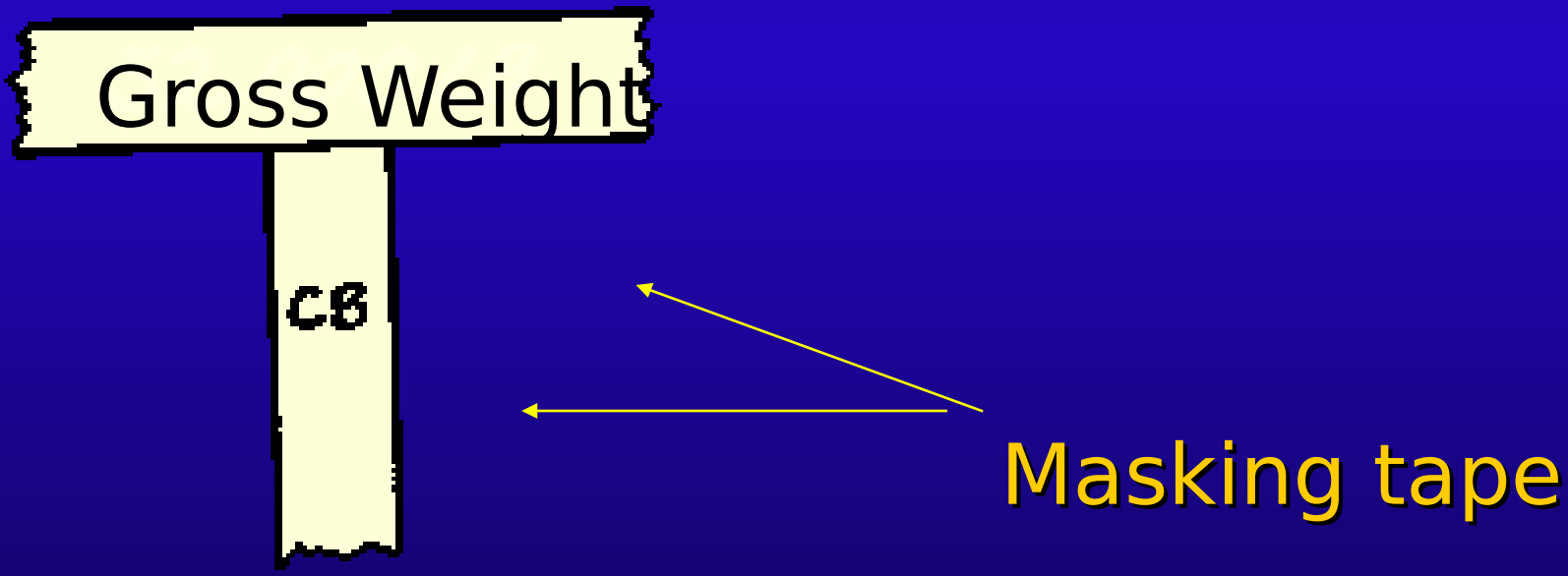
$$CB = \frac{(150 \times 15) + (3{,}600 \times 95)}{3{,}750}$$

$$CB = \frac{2250 + 342{,}000}{3{,}750}$$

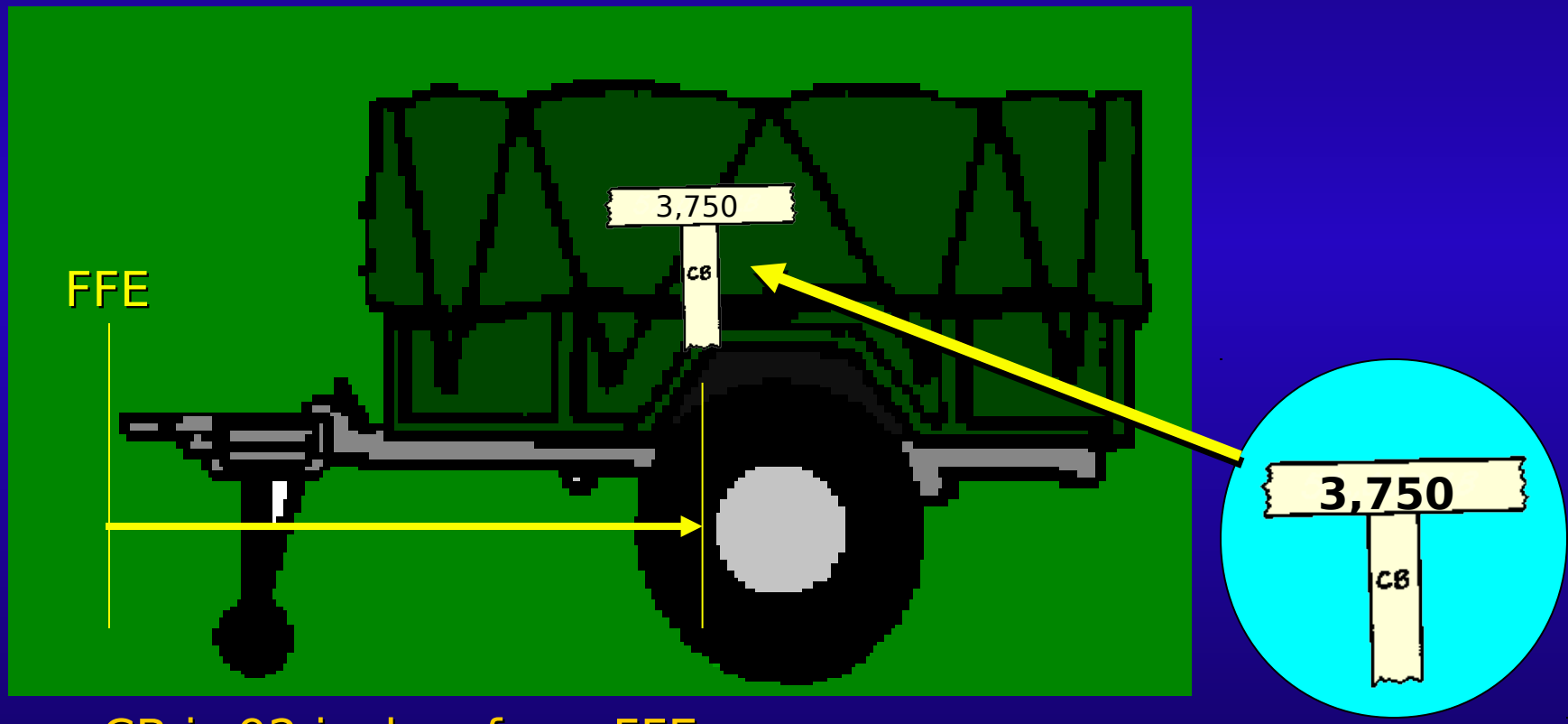
CB = 91.8 or 92 Inches

Center of Balance Marker

After computing CB, mark both sides of the vehicle with masking tape to form a “T” shap

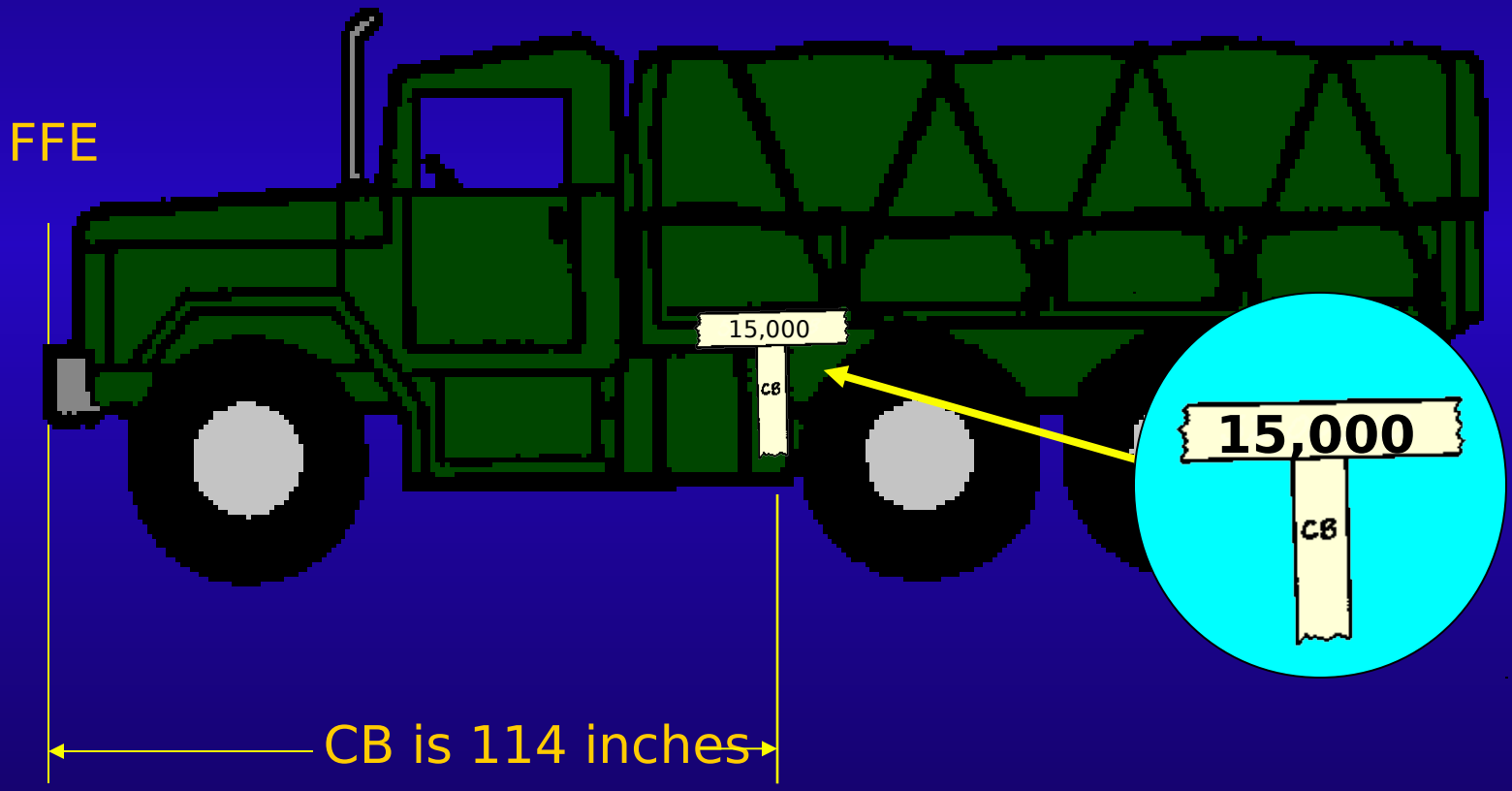


Center of Balance Marker -- Trailer



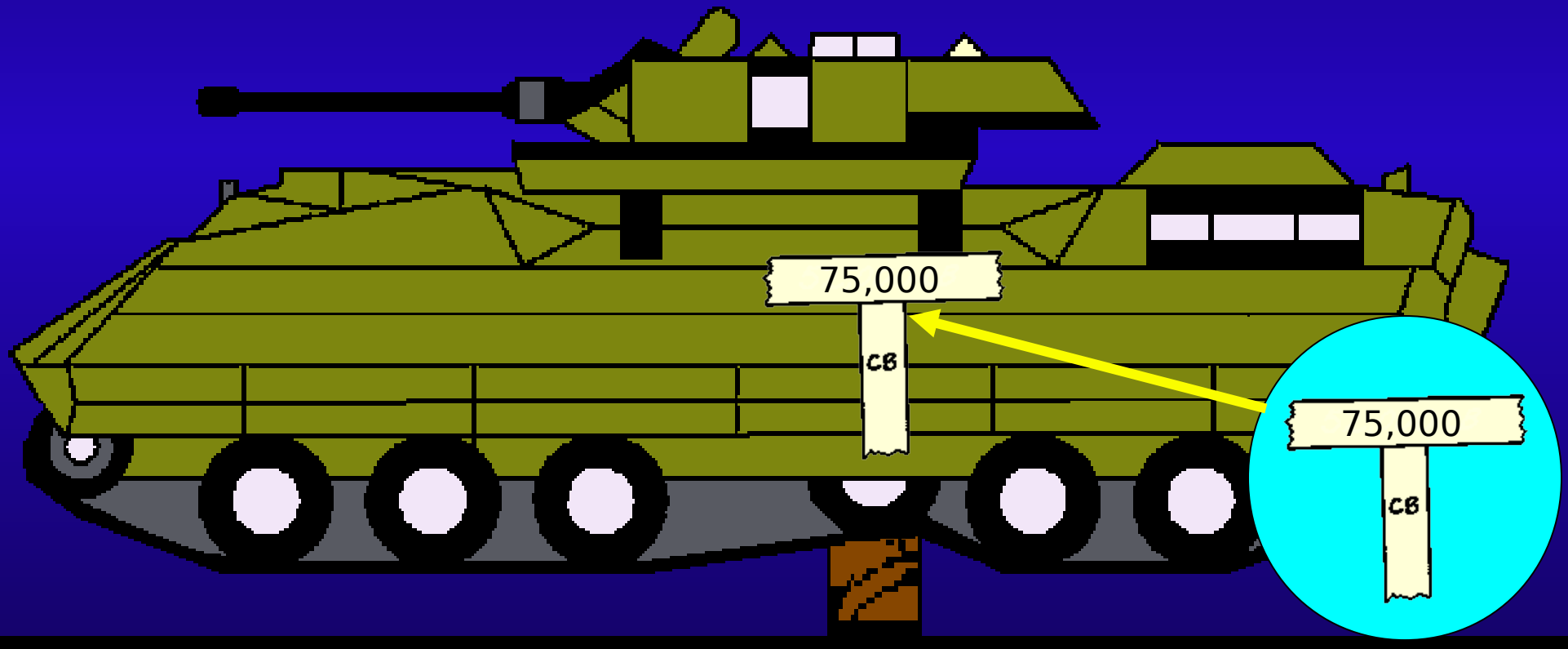
CB is 92 inches from FFE

Center of Balance Marker -- Truck



Center of Balance & Marker -- Tracked Vehicles

- Mark CB at balance point



SUMMARY

On Learning

On Learning

QUESTION 1: What are two pieces of information needed to calculate a vehicle's center of balance?

Answer 1: The distance (in inches) from the front forward edge of the vehicle to each axle, and the weight of each axle.

On Learning

QUESTION 2: What are the criteria for determining if a vehicle or cargo item must have its CB and gross weight identified?

Answer 2: Cargo items 10 feet or longer and items with centers of balance other than in the physical center of the item, must have their gross weight and CB identified.


Let's
Review

On Review

On Review

QUESTION 1: What part of a vehicle is used as a reference point for computing the center of balance?

Answer 1: The front forward edge (FFE) of the vehicle or equipment.

On Review

QUESTION 2: What is the purpose of the Civil Reserve Air Fleet?

Answer 2: CRAF is designed to augment US Military airlift forces with civil air carriers to support National Defense airlift requirements.

On Review

QUESTION 3: If only a top net is used to secure cargo on a 463L pallet, what is the maximum allowable cargo weight?

Answer 3: 2,500 pounds.

On Review

QUESTION 4: True or False. Hazardous items cannot be packed with other non-hazardous cargo on a 463L pallet.

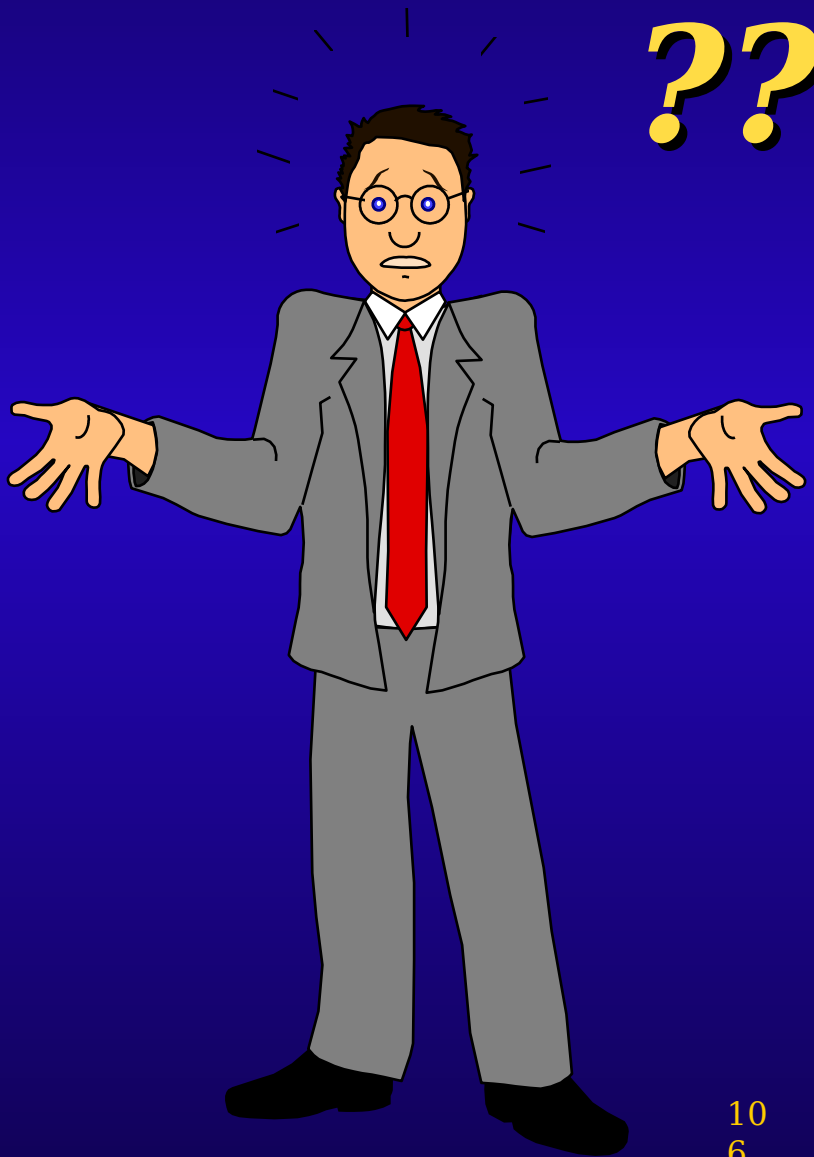
Answer 4: False. Hazardous cargo can be packed with non-hazardous items on a 463L pallet. The HAZMAT must be correctly packaged, labeled, certified, and must be located on the pallet so it is easily accessible.

On Review

QUESTION 5: After a vehicle's CB is determined, how is it marked on the vehicle?

Answer 5: Tape is placed on the vehicle at the location of the CB in the shape of a "T". "CB" is written on the vertical portion of the tape and the vehicles gross weight is written in the "T" cross bar.

QUESTIONS ???



What's Coming

UMODPC

Break

10 mins